The Germans, on the other hand, in teaching science, employ their own language to a large extent, and impose a definite scientific meaning upon common words. It is a remarkable evidence of the formative power of the German language, that it should have been able to produce an imitation of the systematic chemical nomenclature of the French school so complete that it is used in Germany as familiarly as the original system is in France and England. The fact that the most cultivated nation in the world, the Germans, find that they can teach science in their vernacular, deserves the most careful consideration—it seems to furnish at once an argument and an example.

In discussing this question, it is necessary to examine the capabilities of the English language with reference to the purposes of public instruction, but in the first instance we may glance at the development of scientific language in some of the countries of Europe during the last three hundred years.

When the progress of science rendered it necessary to employ new terms in order to express new ideas, two different methods were adopted by different nations. Let us compare the French and English with the German and Dutch method. When, for instance, the French wanted to express in one word the "knowledge of the stars" or the "study of the stars," they borrowed the Greek word *astronomia*, and called it *astronomie*. In like manner the English said *astronomy* but the Germans expressed the meaning of the term in their own language, calling it *Stern-kunde* or "star-knowledge;" similarly the Dutch said *Starre-kunde*, and they have continued using such words to the present day.

In English, then, it has been the custom to take Latin or Greek compounds ready made, although in many instances we might have translated them if we had chosen to do so. If we look to the literal meaning, the original difference between *sphere*, *globe*, and *ball* is that the first is Greek, the second Latin, and the third Saxon. So the Germans call a *hemi-sphere* a "half-ball," and the *globe* upon which we live the "earth-ball."

Now if, in any language, the compound words are, to a great extent, derived from other tongues, such words will be comparatively unintelligible to those who are not conversant with foreign languages. In such a case, the common people will learn the words rather by practice and association than by any exact knowledge of the original meaning; and to the same degree the learned must enjoy a privilege which the illiterate do not possess. Hence there is, in English, a broad distinction between the speech of the general public and the language of science.

Suppose that a working man, in this country, wishes to study Botany, he cannot read one of the ordinary works on that subject, without having his attention distracted by scores of new words which are either Latin or Greek, or else are derived from those languages. Thus he is often disheartened; or, if he succeeds, it is a long time before he overcomes the check which he experienced at the outset, and many a likely student is thus discouraged at the very threshold of his studies.

But the German writers, when they make books for their people, proceed upon a different plan. For if they give the Latin and Greek terms, it is only in brackets, and by way of parenthesis; while in the body of the work they use plain German words, and keep on employing such terms throughout the whole work. Hence, at the first reading, a German youth may go straight on, without paying attention to the Latin terms, and so make himself master of the facts. Afterwards, at a second or third reading, he may study the learned terms, which are repeated in brackets, from time to time, in order to catch the eye of the reader, and thus imprint themselves upon his memory.

For instance, in describing the parts of a flower, the writer does not begin by talking about a "calyx," but speaks of the *cup* (calyx), and calls the leaves of the cup *cup-leaves* (sepals). Similarly, the "corolla" is the *crown*, and its leaves are *crown-leaves* (petals). Thus, when he wishes to tell the learner that a *crown* (corolla) has several leaves, he does not tell him that the "corolla is polypetalous," but that the "crown is many-leaved," or that the "crown-leaves are many."

There is a danger that some of the terms thus employed may not be quite accurate. But the Germans are willing to risk the chance of misapprehension for the sake of making an impression on the mind of the reader, and gaining his attention. If then, half a loaf is better than no bread, it seems more advisable that an unlettered man who wishes to study science, should go through a book which is intelligible, though not absolutely accurate, rather than attempt to read a treatise which is admirably correct, but so full of hard words, that he is tempted at every line to throw down the book in despair.

We have to consider whether such a method can be carried out in English. There can be no doubt that the public would welcome any proposal for the publication of elementary scientific works written in a simple style. Some steps have already been taken in this direction, and scientific writers appear to be cautiously feeling their way. But the plan has not been carried out systematically or boldly, nor has the language of science been fully examined in reference to popular instruction.

Nor are scientific men entirely convinced that the proposed simplification is practicable, or even desirable. Some of them deny that the English language is equal to the task, because we have lost that power of making compound words which confessedly existed in Old English, and which still exists in German. Others contend that even in German the method is characterised by want of precision, and gives rise to confusion; hence they maintain that it is better to frame the scientific terms in words which are not familiar to the common ear, in order to ensure precision and to guard against error.

But in arguing this question two points may be observed. First—That men of high attainments are less averse to the proposed method than men of inferior ability. Secondly—That all are more disposed to see it tried in some other science than in the one which they themselves profess. The grammarian, or the mathematician would not greatly object to a plan for simplifying Botany; "for that," they say, "is a science of hard names." But the botanist replies, "No, you must not touch Botany; suppose you were to try Mathematics." The argument cuts both ways. It is evident that each acknowledges the value of fixed technical terms in his own science, and yet is not unwilling to see a simplification introduced in other branches of study.

The objections urged against the proposed method are of two kinds:—(1) that the system itself is misleading, and the method inaccurate; (2) that even if the plan be practicable in German it is not possible in English.

We shall, in the next article, review these objections in their order.

WM. RUSHTON

NOTES

WE are glad to learn that steps are being taken to bring about such a general application from men of science to the Government for further deep-sea explorations as we referred to some little time ago. This is as it should be. We hear also, that, on the invitation of some of the leaders of science there, Mr. Gwyn Jeffreys will proceed to America in the middle of August, to inspect, in company with Prof. Agassiz, the collections obtained in the American dredgings. Such a proceeding will be of the utmost value to science, and no one is more fitted than Mr. Gwyn Jeffreys to perform such an important work.

As we are going to press we hear of the death of M. Claparède, one of the most distinguished naturalists whom Switzerland has produced. We hope in a future number to give an account of his labours, now unfortunately ended at an early age.

THE "Scheme of Education" Committee of the London School Board have sent in their report recommending science teaching in primary schools. We shall take an opportunity of referring to it on a future occasion.

FORTY of the teachers under the Science and Art Department are now in London for the purpose of undergoing practical training in Biology. For the last two or three years chemical courses of a similar nature have been given. These, however, have been suspended this year. It is impossible to overestimate the good which is being done by the department in this way, and the Government deserves the best thanks, not only of every scientific man, but of every one who cares for the best interests of the country, for what they are doing. There will be similar teaching in Physics next month.

AT a meeting of the Senate of the University of London held on Monday last, Sir Edward Ryan was elected to the office of Vice-Chancellor *pro tem.*, in the place of the late Mr. George Grote.

NOTWITHSTANDING the alleged increased severity of the Matriculation examination at the University of London, and the large proportion who have failed of recent years, the number of candidates presenting themselves at the examination held during the present week is larger than in any previous year, being over six hundred.

THE Ladies' Educational Association has now been definitely connected with University College, London, where all the lectures will in future be held, an arrangement which will doubtless be of great advantage to both students and teachers. The Association has already issued its syllabus for the Michaelmas and Lent Terms of next winter session. The curriculum includes courses for ladies by the professors of Latin, Hebrew, English, French, Italian, German, Philosophy of Mind and Logic, Jurisprudence, Hygiene, History, Constitutional Law and History, Mathematics, Physics, Practical Chemistry, Geology, and Architecture. There will also be classes for Drawing and Painting in connection with the Slade School of Fine Art; and, during the Lent term, Prof. Oliver will deliver a course of ten lectures on the Structure of Plants and General Phenomena of Vegetation, with reference more especially to the general bearing of vegetation upon landscape.

DR. HOOKER and party returned last week from their visit to North Africa. The number of species of plants brought home is estimated at about 1,200, among which it is expected there will be a considerable number entirely new.

A MEETING of the friends and pupils of the late Prof. Goodsir was held in Edinburgh, in June, 1867, under the presidency of Dr. Dunsmure, and it was resolved, "That steps be taken to form a lasting memorial of Prof. Goodsir's distinguished career as an original investigator, and teacher of Anatomy and Physiology, and that the most appropriate manner of commemorating Prof. Goodsir's services, was to establish in the University of Edinburgh a Fellowship in Anatomy and Physiology, to be called the Goodsir Fellowship." A Committee was formed, and subsequently added to, to collect subscriptions, and to decide as to the conditions on which the Fellowship should be awarded. Honorary secretaries were appointed in various parts of the country, and in the Colonies. It was expected that a sufficient fund would have been collected within two years to found the Fellowship. At the present date, however, not more than 620*l.* has been subscribed. The hope of establishing an endowment in the University on the scale of a Fellowship has, therefore, been abandoned, and it is now proposed to institute a Scholarship in Anatomy and Physiology. In order to carry out this project worthily, it is necessary to raise the sum already collected to 1,000*l.*, and renewed efforts are accordingly being now made to provide this amount.

THE Harveian oration on the Progress of Therapeutics was delivered last week in the Royal College of Physicians by Dr. T. K. Chambers, after which the biennial Baly medal for the most distinguished researches in physiological science prosecuted during the past two years, was presented by the president to Dr. Lionel S. Beale.

THE Royal Agricultural Society has decided on appointing a Consulting Botanist, at a salary of 100*l.* per annum, the engagement to be an annual one. It will be the duty of the botanist to examine plants, seeds, &c., for members of the society, and to report the principal work performed from time to time for its members, and to undertake the work at fixed rates, to be arranged before his appointment, and to furnish papers to the Journal on special subjects of botanical interest. The appointment of an Entomologist to the Society has also been in contemplation.

AN International Congress, for the progress of Geographical Science, will be held at Antwerp from the 14th to the 22nd of August. A number of questions in Geography, Meteorology, Navigation, Ethnology, &c., will be submitted for discussion. An exhibition will also be held of objects connected with the purpose of the Congress, maps, plans, instruments used in navigation, &c., and prizes will be awarded for the best object exhibited in each class.

THE excursion of the Geologists' Association to Yeovil and neighbourhood on the 29th of May and three following days was a very successful one. Near Yeovil Junction station the Yellow Micaceous sands, considered by Dr. Wright to be of Upper Liassic Age, were examined, and characteristic fossils obtained. The large collection of Mesozoic fossils collected by the Rev. Edward Bower, at Closworth Rectory, was inspected, as well as that of the Rev. T. C. Maggs, of Yeovil. The next morning, under the guidance of Prof. Buckman, the party ascended the fine escarpment of Babylon Hill, where bands of concretionary sandstone contain fossils essentially Oolite and not Liassic. The characteristic fossils of the well-known "Cephalopod-bed," considered by Prof. Buckman to be at the top instead of at the base of the series, as generally supposed, were obtained at the celebrated Half-way House Quarries, and at a small but very prolific quarry on the Professor's own estate at Bradford Abbas. The following day the far-famed quarries of Ham Hill were visited, and the great bed of Inferior Oolite Freestone, which has supplied material for the churches and other buildings of the district for centuries, was carefully examined. The Middle and Upper Lias were also investigated at South Petherton; and on the fourth day the interesting and picturesque Keuper Cliffs at Seaton were examined, and the coast section followed until the "Landslip" was reached, extending for a distance of about six miles.

THE thirty-seventh Anniversary Meeting of the Statistical Society was held on Thursday, the 22nd of June, Mr. William Newmarch, F.R.S., president, in the chair. The following is the list of president, council, and officers elected to serve for the ensuing twelvemonths, viz.:—President—Dr. William Farr, F.R.S. Council—Dr. T. G. Balfour, F.R.S., R. Dudley Baxter, Samuel Brown, Dr. Hyde Clarke, L. H. Courtney, W. Fowler, M.P., F. Galton, F.R.S., Robert Giffen, Rt. Hon. W. E. Gladstone, M.P., W. A. Guy, M.B., F.R.S., Archibald Hamilton, J. T. Hammick, F. Hendriks, J. Heywood, F.R.S., F. Jourdan, Prof. Leone Levi, Sir Massey Lopes, Bart., M.P., W. G. Lumley, Q.C., J. MacClelland, Dr. F. J. Mouat, W. Newmarch, F.R.S., R. H. I. Palgrave, R. H. Patterson, F. Purdy, W. H. Smith, M.P., T. Sopwith, F.R.S., Col. W. H. Sykes, M.P., F.R.S., Ernest Seyd, W. Tayler, Prof. Jacob Waley. Treasurer—J. T. Hammick. Honorary secretaries—W. G. Lumley, Q.C., F. Purdy, Jacob Waley.

The Winchester College Natural History Society, founded on March 12, 1870, has just issued its first Report, which includes some useful papers, and botanical, entomological, and palæontological lists of the neighbourhood. It gives promise of good and useful work to be done in future years.

We have received the thirty-eighth annual report of the Royal Cornwall Polytechnic Society. As might be expected from the locality of the society, the majority of the papers bear on subjects connected with mining and metallurgy; though there are also some meteorological tables, and a useful list of addenda to the fauna of the county. A marked feature of the report is the number of woodcuts illustrative of various adaptations of machinery, &c., connected with the subjects of the papers.

Dr. Lauder Lindsay has reprinted his essay on the Physiology and Pathology of Mind in the Lower Animals, in which he insists that the mind of the lower animals does not differ in kind from that of man; and that they possess the same affections, virtues, moral sense, and capacity for education, and are liable to the same kinds of mental disorders.

Mr. W. Robinson, author of "The Wild Garden," "Alpine Flowers for English Gardens," &c., publishes a useful Catalogue of Hardy Perennials, Bulbs, Alpine Plants, Annuals, Biennials, &c., intended as a help to exchanges between cultivators of hardy plants, analogous to those that have long been common among botanists.

We have received Nos. 203-206 of the "Bücher-Verzeichniss" of Friedländer and Son, of Berlin, comprising the following subjects—"Geology, Mineralogy, and Crystallography," "Botany," "Zoology," and "Mathematics, Physics, Astronomy, and Technology."

Mr. Pengelly has reprinted two papers read before the Devonshire Association for the Advancement of Science, Literature, and Art, "On the rainfall received at the same station by gauges at different heights above the ground," and "On the supposed influence of the moon on the rainfall," in which he thus sums up the conclusions arrived at:—"1. That under unobjectionable conditions, and at the same station, less rain will be received by a gauge high above the ground than by one nearer the surface; 2. That the total defect will increase with increase of height; 3. That the defect will not increase so rapidly as the height." And again:—"The result of my observations then may be briefly summed up thus: At Torquay, the second quarter of the moon, or that which terminates on the day before each full moon, had the least number of wet days, the heaviest average daily rate of rain, and the greatest aggregate rainfall; whilst the third quarter, or that commencing on the day of each full moon, had the greatest number of wet days, the lightest average daily rate of rain, and the second greatest aggregate rainfall. The differences are but slight; but it must be borne in mind that the moon's meteorological influence can be but slight. The results, however, do not accord with any of those mentioned by the authors so largely quoted at the commencement of this paper, yet they are such, and only such, as are calculated to induce any one to pause before giving an opinion for or against the alleged connection of the moon with our rainfall. Perhaps I cannot better conclude than by echoing the words of M. Arago, 'The subject requires to be examined afresh.'"

It is reported that about June 7, an earthquake took place on the south coast of Asia Minor, opposite Rhodes, resulting in the almost total destruction of the small town of Marmaritza.

Strong earthquakes continue in Peru. There was one in Arequipa on April 11. The movements were from east to west, and the duration forty to fifty seconds. It is worthy of notice that on the same April 11 two slight shocks of earthquake were felt at Rangoon, in Burmah, the direction being from north to south. On the night of the 16th another earthquake was felt.

Earthquake shocks were felt on May 21st in the vicinity of Rochester and Buffalo, in the state of New York; at Augusta, in Georgia; and at Quebec, Ottawa, and other points in Canada.

The remote island called Sunday Island, in the Pacific, has been subjected to a terrible volcanic eruption so that the inhabitants have been removed to Norfolk Island, to join the descendants of the *Bounty* Mutineers.

On February 22 several shocks of earthquake were felt at Puno, in Peru, and on March 4 a slight earthquake of thirty seconds at Arequipa after several rainy days.

On February 7 two distinct shocks of earthquake were felt in the department of Minititlan, in Mexico, followed by a wave rising one foot.

Among the late remarkable disturbances in the Pacific basin are to be numbered those affecting the waters of the ocean around the guano Islands of Guanape on the Peruvian coast, which took place on the 5th of February. During the whole of that day the sea was much agitated, though nothing particular was noted in the tides. On the morning of the 6th there was something strange about the currents, with a westerly wind freshening with dangerous force. The winds and currents ruling along the Peruvian coast are from the S.E., but on the 6th this was not so, for they veered round and came from the W. at six miles an hour (? currents). Then it was noticed that as the day grew on the currents seemed to flow in from all directions, forming numerous whirlpools, while alarm for the shipping was caused by the increasing strength of the west wind. The nights of the 6th and 7th were consequently times of alarm to the masters of the guano ships, which were dashed against each other. The phenomena had a great resemblance to those at Arica and the Chincha Islands on the 15th of August, 1868. On the 9th of February the appearances were calmer, and the wind veered round to S.E.

At Pichicani, in Peru, an extraordinary meteor appeared on February 12. It was of a red colour, balloon-shaped, with the end or neck pointed to the earth, and exploded as it reached the surface, leaving a dark cloud on the plain, injuring the roofs of several huts, and knocking down a fence of about 500 yards belonging to a farm. Among the fragments of this meteorite were found dead fish of several species, supposed to have been lifted out of the river. Similar phenomena had been observed near Huacochullo and Atucachi.

Indian papers report that the tea prospects in Darjeeling this year are so favourable that up to the present time (May) the crop has been from twice to three times what it was at that date last season.

The report of the Curator of the Natal Botanic Garden for 1870 states that there had been shipped to various public and private gardens 5 Ward's cases, 22 boxes, and 11 parcels, and that there had been received 13 Ward's cases, 9 boxes, and 22 parcels.

It is reported from Chile that the Planchon Pass across the

Andes, the main line from Chile to Buenos Ayres, has been disturbed for about three miles by the eruption of hillocks.

AN Australian paper states that a live frog had been brought to the office that had been found three or four days before incased in the solid rock, in the drive of the Sultan mine, Barry's Reef, at a depth of 400ft. below the surface. The little animal looked bright-eyed and very lively, and was apparently none the worse for its long term of solitary imprisonment.

SCIENCE IN AMERICA *

THE forthcoming number of the *American Journal of Science* will contain an extremely interesting announcement in regard to American palæontology, namely, the discovery by Prof. Marsh in the Cretaceous beds of the Rocky Mountain region, of a huge pterodactyl, or flying lizard. This form has long been known as characteristic of the deposits of Europe, and has always attracted much attention from its combination of the characters of the bird and reptile; but until this announcement by Prof. Marsh the family was not supposed to be represented in the New World. The addition therefore of the pterodactyl, to the list of American genera, shows a marked increase in palæontological affluence, and gives additional point to the statements made some time ago, that America, instead of being greatly inferior to the Old World in the variety of its vertebrate fossil remains, now bids fair to greatly exceed it in this respect. The name assigned to this new species is "Pterodactylus Oweni" (in honour of Prof. Richard Owen of London), and it is believed to have had an expanse between the tips of the wings of at least twenty feet.—We regret to learn that during the recent revolution on the Isthmus of Tehuantepec a large number of valuable collections in natural history, made for the Smithsonian Institution by its correspondent in that region, Prof. Sumichrast, were entirely destroyed in the course of the conflicts of the opposing parties.—The annual report of the Smithsonian Institution for 1869 has, after an unusual delay, just made its appearance from the public printing-office, and contains the customary variety of interesting matter, which has made this report so much sought after by persons of scientific tastes in the United States. Preceded by the secretary's usual report of the operations of the Institution for the year, it contains in an appendix numerous articles, partly original, and partly translations from such foreign journals as are not readily accessible to the American student. Among these may be mentioned biographies of Thomas Young, Augustus Bravais, Von Martius, and Marianni; an important original paper by Dr. Sterry Hunt on the chemistry of the earth; and one by Marey on the phenomena of flight in the animal kingdom; an extended paper by General Simpson, upon the march of Coronado in search of the seven cities of Cibola; one by Sir John Lubbock, on the social and religious condition of the lower races of man, &c. The report is in no way inferior in interest to its predecessors. —Salt Lake City has lately been the scene of considerable activity, in connection with the arrival there of several government exploring parties, for the purpose of fitting out for their summer's campaign. Among these may be mentioned Mr. Clarence King, who continues his geological and topographical exploration of the fortieth parallel eastward through Colorado; Major Powell, who renews his examination of the canons of Green River and the Colorado, and who is detained at Salt Lake City in consequence of the late melting of the mountain snows, the low stage of water preventing him from passing through the canons; and a portion of Prof. Hayden's party is also at the same place collecting animals and supplies for a visit to the Yellow Stone region.—By advices from South America we learn that on the 25th of April last Chili was visited by two of the severest earthquakes that have been experienced in the country since 1851. The first shock in Valparaiso was not preceded by any warning sound, and its suddenness and intensity created considerable alarm, the streets of the city being filled in a short time by people who rushed out from their dwellings in a state of indescribable confusion.—Many of our readers are familiar with the names of Mr. Thomas Say, of Philadelphia, and Mr. C. A. Leseur, as having been among the most prominent of our naturalists during the early part of the present century, and as having added many new species to the lists. The labours of Mr. Say were directed largely toward the invertebrata, embracing more particularly the insects, shells, and crustaceans. Many of his explorations were in the vicinity of Beesley's Point, New Jersey, where species were obtained by him that have ever since remained almost unknown to science. Several examinations have been more recently made on the New Jersey coast, for the express purpose of recovering these forms; and one of the most successful was prosecuted last spring, under the direction of Prof. Verrill, of Yale College, who, with several companions, spent a week at Somers Point and Beesley's Point. The results of their labours were much greater than they had anticipated, as they not only obtained a large proportion of all the missing forms, but secured quite a number of new species, and detected the occurrence, for the first time, of others previously known as belonging much farther south, among them two echinoderms, of which Cape Hatteras was the limit previously ascertained. Their "catch" for the week summed up about 175 species of marine animals—about 25 of fishes, 50 of crustaceans, 25 of worms, 50 of mollusks, and 15 of radiates and sponges.

MR. BENTHAM'S ANNIVERSARY ADDRESS TO THE LINNEAN SOCIETY

(*Continued from page* 152)

GERMANY, or rather Central Europe from the Rhine to the Carpathians and from the Baltic to the Alps, is, as to the greater part of it, a continuation of that generally uniform but gradually changing biological region which covers the Russian empire. It is not yet affected by those peculiar western races which either stop short of the Rhine and Rhone or only here and there cross these rivers with a few stragglers; the mountains, however, on its southern border show a biological type different from either of those which limit the Russian portion, indicating in many respects, as I observed in 1869, a closer connection with the Scandinavian and high northern than with the Pyrenean to the west or the Caucasian to the east. The verifying and following up these indications gives a special interest to the study of German races, their variations and affinities. In so far as formal specific distinctions are concerned, all plants and animals, with the exception of a few of those whose minute size enables them long to escape observation, may now be considered as well known in Germany as in France and England; and in Germany especially the investigation of anatomical and physiological characters has of late years contributed much to a more correct appreciation of those distinctions and of the natural relations of organic races. But much remains still for the systematic biologist, and especially the zoologist, to accomplish. Among the very numerous floras of the country, both general and local, there are several which have been worked out with due reference to the vegetation of the immediately surrounding regions, but corresponding complete faunas do not appear to exist. A few in some branches have been commenced; but in these, as in the numerous papers on more or less extended local zoology, as far as I can perceive, animals, and especially insects, seem to be considered only in respect of the forms they assume within the region treated of, frequently with a very close critical study of variations or races of the lowest grades, but neglecting all comparison with the forms a species may assume or be represented by in adjoining or distant countries.

Germany holds a first rank amongst civilised nations in respect of her biological works in most departments; they probably exceed in bulk those of any other country. Her publishing scientific academies and other associations, her zoological museums and gardens, her botanical herbaria and university gardens, her zoologists and botanists of world-wide reputation, are far too numerous to be here particularised. She excels all other nations in the patient and persevering elaboration of minute details, although she must yield to the French in respect of clearness and conciseness of methodical exposition. Her speculative tendencies are well known, and the great impulse given to them since the spread of "Darwinismus" appears to have thrown systematic biology still further into the background; the sad events of the last twelvemonth have also temporarily suspended or greatly interfered with the peaceful course of science. Thus the zoological works contained in the lists I have received are almost all dated in 1868 or 1869, and have been already analysed in the reports of Wiegmann's "Archiv" and in the 5th and 6th volumes of the "Zoological Record," and the principal ones relating to exotic zoology will have to be referred to further on. In Systematic Botany also but little of importance has been published within the last ten years beyond the great "Flora Brasiliensis," which, since the death of Dr. v. Martius, has been

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* Communicated by the Scientific Editor of *Harper's Weekly*.